भारतीय मानक
Indian Standard

IS 1577 : 2019

तम्बाकू एवं तम्बाकू उत्पाद — सिगरेट — विशिष्टि

(चौथा पुनरीक्षण)

Tobacco and Tobacco Products — Cigarettes — Specification

(Fourth Revision)

ICS 65.160

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January 2019 **Price Group 5**

Tobacco and Tobacco Products Sectional Committee, FAD 04

FOREWORD

This Indian Standard (Fourth Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Tobacco and Tobacco Products Sectional Committee had been approved by the Food and Agriculture Divisional Council.

Cigarettes are manufactured under different brand names varying in the tobacco blend used, the processing method employed, and the finish of the packing. Moreover, many imported cigarettes are now available in the Indian market as the import of cigarettes has been allowed since April 2000. As the appreciation of any brand of cigarette depends on an individual's perception, it is difficult to lay down a fixed standard for cigarettes. However, an attempt has been in this standard to lay down certain minimum requirements to produce cigarettes with consistent quality.

This standard was first published in 1960, and subsequently revised in 1975, 1989 and 2008. This fourth revision has been undertaken in order to update the standard in the light of current industrial and trade practices, advances in methods of analysis and the Rules and Regulations under the *Cigarettes and Other Tobacco Products Act (COTPA)*, 2003. In this revision, requirements of freedom from mould attack and burning quality have been deleted. Requirement of loose shorts has been replaced by end stability and a method for its determination has been adopted from an ISO standard. Requirement of acid insoluble ash has been substituted by silicated residue acid insoluble ash. Methods for circumference measurement and filling density determination have been updated.

For the purpose of deciding whether a particular requirement of this standard is complied with the final value, observed or calculated, expressing the result of a test or analysis shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

TOBACCO AND TOBACCO PRODUCTS — CIGARETTES — SPECIFICATION

(Fourth Revision)

1 SCOPE

1.1 This standard prescribes the requirements and the methods of sampling and testing of cigarettes.

1.2 This standard does not cover the requirements for flavour and aroma of cigarettes.

2 REFERENCES

The standards given below contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of these standards.

IS No.	*Title*
1070 : 1992	Reagent grade water — Specification (*third revision*)
5643 : 1999	Tobacco and tobacco products — Method of test for tobacco (*second revision*)
12942 : 2018 /ISO 8243 : 2013	Cigarettes — Sampling (*third revision*)
15795 : 2018 /ISO 2971:2013	Cigarette and filter rods — Determination of nominal diameter — Method using laser beam measuring apparatus (*first revision*)
16026 : 2012 /ISO 15152 : 2003	Tobacco — Determination of the content of total alkaloids as nicotine — Continuous flow analysis method
16121 : 2013 / ISO 3402 : 1999	Tobacco and tobacco products — Atmosphere for conditioning and testing
16132 : 2014 /ISO 2881 : 1992	Tobacco and tobacco products — Determination of alkaloid content — Spectrometric method
16236 : 2015 /ISO 2817 : 1999	Tobacco and tobacco products — Determination of silicated residues insoluble in hydrochloride

3 TERMINOLOGY

For the purpose of this standard, the following definitions shall apply

3.1 Cigarettes — Cigarettes shall be made of a filler mixture of fine cut tobacco and blend adjuncts wrapped in cigarette paper, with or without filter. A cigarette without filter is called ‘plain cigarette’ or ‘non-filter cigarette’ and the one with filter ‘filter cigarette’ or ‘filter tipped cigarette’. A ‘plain’ or ‘non-filter cigarette’ with one of its end wrapped in tipping paper is called ‘tipped cigarette’.

3.1.1 *Tobacco Rod* — That portion of a cigarette which contains cut tobacco. Thus, a plain cigarette is only a tobacco rod while a filter cigarette is a tobacco rod with an attached filter plug.

3.1.2 *Tipping Paper* — Tipping is the process which combines filter tip to the tobacco rod using a specialty paper called tipping paper. The tipping paper wraps the entire filter tip and also overlaps a few mm of the tobacco rod to keep the filter tip firmly anchored in a cigarette. This small piece of paper at the mouth end of a finished cigarette is also commonly called as tipping. Tipping also prevents the sticking of a cigarette to the smoker’s lips.

3.1.3 *Filter Plug* — Also known as filter tip in a filter cigarette, it is a piece of filter rod of specified length and compatible circumference attached to the tobacco rod with tipping paper.

NOTE — All these cigarette components are specifically designed to suit each brand, hence measured and monitored. These components are identified in Fig. 1 and Fig. 2

3.2 End Stability — It is the resistance of cigarettes to lose tobacco from cigarette ends in handling and transportation during manufacturing. The higher a cigarette’s resistance to loss of tobacco from its end, the higher will be its end stability. End stability is determined by quantifying the amount of tobacco which will fall from the end of a cigarette during a standardized agitation period reported as loss of tobacco (fallout) in mg/cig or mg/cigarette end. The lower the tobacco fallout, the better will be the quality of cigarette ends.

3.3 Filling Density — Amount of cut tobacco required to fill one cm^3 of the tobacco rod in a cigarette expressed as g or mg per cm^3 at 13.5 percent moisture content. Filling density of each cigarette brand is different depending on its tobacco blend. It is specified for manufacturing of each cigarette product to optimize its quality in terms of firmness, pressure drop and ends stability.

3.4 Side Seam — The longitudinal edges of the cigarette paper are joined/stuck together with an adhesive. This joint running along the length of a cigarette is called the side seam.

4 REQUIREMENTS

4.1 Description

The cigarettes shall be cylindrical or oval in shape. The ends of the cigarettes shall be evenly cut and stable. The cigarettes are manufactured in different lengths, circumferences and densities as per market requirements. They shall be free of infestation.

4.2 Lengths

The lengths of the cigarette and its components (*see* **3.1**) are identified in Fig. 1 and Fig. 2 and shall be measured by the method prescribed in Annex A.

4.2.1 *Cigarette Length*

The length of the cigarette shall be the distance in mm between the two ends of a cigarette.

4.2.2 *Tobacco Rod Length*

The distance between the two ends of the tobacco rod i.e. the portion of a cigarette which is filled with cut tobacco.

In case of a filter cigarette, it can also be defined as the length of the filter cigarette minus the length of the filter plug. Thus, the length of cigarette paper in a cigarette is also a measure of tobacco rod length. Tobacco rod length is needed to calculate the volume of the rod and also the filling density of a cigarette.

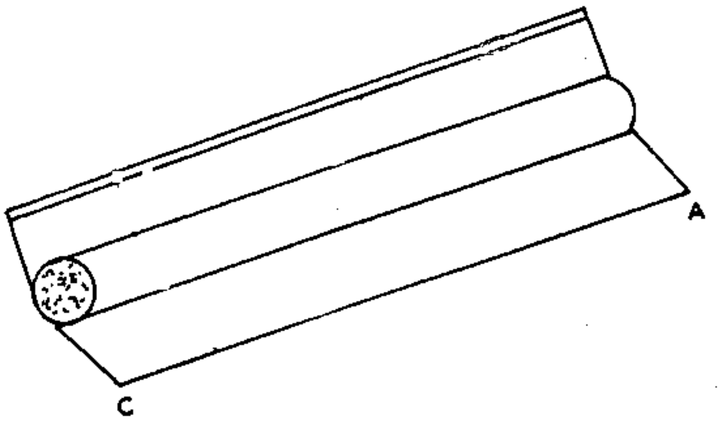

FIG. 1 PLAIN CIGARETTE

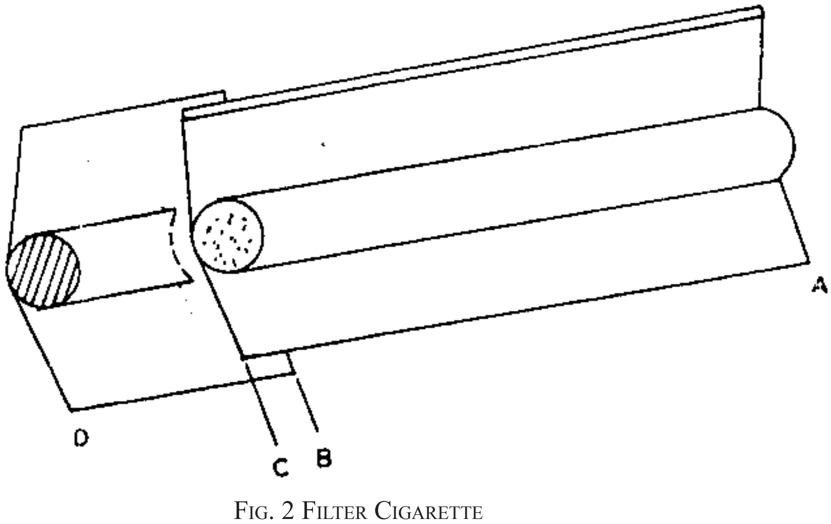

FIG. 2 FILTER CIGARETTE

4.2.3 *Filter Plug Length*

The distance between the two ends of the filter plug in a filter cigarette.

4.2.4 *Tipping Length*

The distance between the two ends of the tipping used for combining the tobacco rod and the filter plug in a filter cigarette.

4.3 Circumference

The circumference of the cigarette is identified in Fig. 1 and Fig. 2 and is measured as prescribed in Annex B. Circumference is an important physical parameter to meet the marketing needs and also for the determination of the filling density of cigarettes.

4.4 Mass of Tobacco Blend per Cigarette

Mean mass of tobacco blend in a cigarette is measured by the method prescribed in Annex C. Amount of tobacco in a cigarette is specified and measured to control the cigarette yield per kg of tobacco blend and also to determine the filling density of the cigarette.

4.5 Filling Density

The filling density in a cigarette shall be determined by the method prescribed in Annex D.

4.6 Freedom from Beetle Attack

The cigarette shall be free from any tobacco beetle attack when examined by the method prescribed in Annex E.

4.7 End Stability

End stability of cigarettes will be determined by the method prescribed in Annex F.

4.8 Tobacco Blend

The tobacco blend used in the manufacture of cigarettes shall be a blend of any or many, of the following in predetermined fixed proportion to create a unique product:

a) Various types/grades of tobacco lamina; and
b) Blend adjuncts like cut or shredded midribs, reconstituted tobacco and expanded tobacco.

4.9 The tobacco blend shall also confirm to the requirements specified in Table 1.

5 MARKING

5.1 The following particulars shall be legibly and indelibly marked on bulk container in addition to declarations as required under any applicable statutory Rules and Regulations:

a) Name and address of the manufacturer;
b) Brand name or Trademark, if any;
c) Cigarette length;
d) Net quantity;
e) Date of manufacture or date code;
f) Any other marking required under the *Legal Metrology (Packaged Commodities) Rules*, 2011; and
g) Statutory health warnings in the manner and in accordance with the provisions of the Rules framed under the *Cigarettes and Other Tobacco Products Act*, 2003 (COTPA).

5.2 BIS Certification Marking

The product may also be marked with the Standard Mark.

5.2.1 The use of standard mark is governed by the provisions of the *Bureau of Indian Standards Act*, 2016 and the Rules and Regulations made there under. The details of the conditions under which the licence for use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

Table 1 Requirements for Tobacco Blend in Cigarettes

(*Clause* **4.9**)

Sl No. (1)	Characteristic (2)	Requirement (3)	Method of Test, Ref to (4)
i)	Oven moisture, percent by mass, *Max*	17.0	**6** of IS 5643
ii)	Total alkaloid as nicotine, percent by mass (on dry basis), *Max* [1)]	3.5	**8** of IS 5643 or IS 16026 or IS 16132
iii)	Total ash, percent by mass (on dry basis), *Max*	20.0	**10** of IS 5643
iv)	Silicated residues insoluble in hydrochloric acid, percent by mass (on dry basis), *Max*	3.0	IS 16236

[1)] IS 16026 shall be the reference test method for determination of total alkaloid as nicotine

6 PACKING

The cigarettes shall be packed in retail packages which will carry appropriate and applicable markings as per **5**.

7 SAMPLING FOR TEST PURPOSES

The method of drawing representative samples of the cigarettes shall be as prescribed in IS 12942 or as agreed to between the purchaser and the manufacturer

8 TESTS

8.1 Tests shall be carried out as prescribed in **4.2** to **4.7** and col 4 of Table 1.

8.2 The atmosphere in the conditioning cabinet and inside the laboratory where the tests are to be carried out, shall be maintained as prescribed in IS 16121. Samples should be conditioned in the conditioning cabinet as prescribed in IS 16121.

8.3 Quality of Reagents

Unless specified otherwise, pure chemicals shall be employed in tests and distilled water (*see* IS 1070) shall be used where the use of water as reagent is intended.

NOTE — 'Pure chemicals' shall mean chemicals that do not contain impurities which affect the test results.

ANNEX A

(*Clause* 4.2)

DETERMINATION OF LENGTH OF THE CIGARETTE AND ITS COMPONENTS

A-1 PROCEDURE

Take 20 conditioned cigarettes. Slit the cigarettes through a line parallel to the seam of the cigarette using a sharp blade and taking care to have a straight and clean cut. For the purpose, an electrically operated slitter could also be used. Remove the cut tobacco and filter plug in the case of filter cigarettes, carefully from the slit cigarettes and preserve the same for determination of their mass and length, respectively. Measure the various lengths (*see* **4.2**) as given below to the nearest 0.5 mm (*see* Fig.1 and Fig. 2), using a steel scale. A traveling microscope or any other suitable measuring equipment may also be used.

a) *Cigarette Length:*
   1) Plain cigarette — A to C (*see* Fig. 1)
   2) Filter cigarette — A to D (*see* Fig. 2)
b) *Filter Plug Length* — C to D (*see* Fig. 2)
c) *Tobacco Rod Length:*
   1) Plain cigarette — A to C (*see* Fig. 2)
   2) Filter cigarette — A to C (*see* Fig. 1)
d) *Tipping Length* — B to D (*see* Fig. 2).

A-2 CALCULATION

Calculate the average length in mm as arithmetic mean of lengths of various components from 20 cigarettes and express the result to nearest to 0.5 mm.

A-3 REPORTING

The test report shall carry the following:

a) Full identification of the cigarette sample;
b) Method of sampling;
c) Cigarette length expressed to nearest 0.5 mm, with SD;
d) Tobacco rod length expressed to nearest 0.5 mm;
e) Filter plug length expressed to the nearest 0.5 mm; and
f) Tipping length (mm).

ANNEX B

(*Clause* 4.3)

DETERMINATION OF MEAN CIRCUMFERENCE OF CIGARETTES

B-1 PROCEDURE

Measure the width in the middle of the cigarette paper from each slit cigarette (*see* **A-1** and Fig. 1 and Fig. 2). Use a magnifying glass for recording the width to the nearest 0.5 mm.

B-2 CALCULATION

B-2.1 Calculate the average circumference of the cigarette as the arithmetic mean of the twenty measurements. Record the mean circumference to the nearest 0.05 mm with SD.

B- 2.2 The circumference of cigarettes can also be measured by the method using laser beam prescribed in IS 15795.

NOTE — The circumference value obtained by the laser beam method, if used for calculating volume of the tobacco rod, should be corrected for the cigarette paper thickness by subtracting 0.042 mm from the mean circumference value.

B-2.3 If needed, the circumference can be converted into diameter by the following formula

$$\text{Diameter} = \text{circumference} \div \pi$$

B-3 REPORTING

The test report will carry the following:

a) Full identification of the sample;
b) Method of sampling;
c) Mean circumference (mm) and SD; and
d) Method used for circumference measurement.

ANNEX C

(*Clause* 4.4)

DETERMINATION OF MEAN MASS OF TOBACCO BLEND IN CIGARETTES

C-1 PROCEDURE

Weigh, on a tared dish the mass of tobacco collected from the 20 cigarettes (*see* **A-1**) Record the mass to the nearest 0.001 g.

C-2 CALCULATION

Calculate the arithmetic mean of the mass of tobacco from 20 cigarettes (*see* **C-1**) recorded to the nearest 0.001 g per cigarette

C-3 REPORTING

The test report shall carry the following:

a) Full identification of the sample;
b) Method of sampling; and
c) Mean mass of tobacco per cigarette expressed to the nearest 0.001 g.

ANNEX D

(*Clause* 4. 5)

DETERMINATION OF FILLING DENSITY OF CIGARETTES

D-1 PROCEDURE

D-1.1 Determine the length of the tobacco rod as prescribed in Annex A.

D-1.2 Determine the circumference of the cigarette as prescribed in Annex B (*see* **B-2.1** and **B-2.2**)

D-1.3 Determine the moisture content of the tobacco blend of the cigarettes as received in accordance with **6** of IS 5643.

D-2 CALCULATION

D-2.1 Calculate the volume of the tobacco rods in cm^3 from the following formula:

$$V \text{ in cc} = C^2\, L \div 4\,\pi$$

Where,

C = circumference, in cm (*see* **B-2.1** and **B-2.2**), and
L = length of tobacco rod, in cm.

D-2.2 Calculate the filling density of the cigarettes at the received moisture content from the following formula:

$$\text{Filling density (FD) in g/cm}^3 = W \div V$$

Where,

W = mass of tobacco, in g as determined in **C-2**, and
V = volume of tobacco rod, in cm^3.

D-2.3 Calculate the filling density (FD) of the cigarette at 13.5 percent moisture content as follows:

$$FD_{\text{at 13.5 percent moisture}} = \frac{D \times (100 - M)}{86.5}$$

Where,

FD = filling density, in g/cm^3 (*see* **D-1**), and
M = moisture content, percent by mass, of the tobacco blend as received.

D-3 REPORTING

The test report shall carry the following:

a) Full identity of the cigarette sample;
b) Method of sampling;
c) FD of cigarette at received moisture expressed as, g/cm^3; and
d) FD of cigarette (corrected to 13.5 percent moisture content) expressed, as g/cm^3.

ANNEX E

(*Clause* 4.6)

EXAMINATION FOR FREEDOM FROM TOBACCO BEETLE

E-1 PROCEDURE

E-1.1 Take 5 cigarettes and examine visually their outer surface for the presence of any borings by tobacco beetles. Slit these cigarettes one by one and empty the contents on a clean white sheet of paper

E-1.2 Examine the contents carefully for the presence of tobacco beetle (*Lasioderma serrecorne*) in all its stages, that is larva, pupa and adult, whether alive or dead. Examine either visually or with the help of a hand lens (magnification 10X). In case a larger magnification is used, this shall be stated in the test report.

E-2 REPORTING

The test report will carry the following:

a) Full identification of the sample;
b) Method of sampling;
c) Method of examination- naked eye/magnifying lens (strike out what is inapplicable); and
d) Test result:
    1) If beetles not found, the report will state 'Sample free from beetle attack', and
    2) If beetles found, the report will state 'Sample not free from beetle attack'.

ANNEX F

(*Clause* 4.7)

TESTING OF END STABILITY OF CIGARETTES BY DETERMINING LOSS OF TOBACCO FROM THE CIGARETTE ENDS USING A ROTATING CYLINDRICAL CAGE

F-0 PRINCIPLE

The measuring device is based on the rotation of a cylindrical cage of elliptical cross section through which tobacco is allowed to fall into a weighing vessel. A test portion of a given number of cigarettes is placed in the cage formed of closely spaced parallel rods. During the test, the cage rotates around its horizontally positioned longitudinal axis and .the cigarettes tumble in the cage. The amount of tobacco fallout from the open ends of the cigarettes is determined. The test conditions depend on the size and shape of the cage, the diameter and the spacing of the rods, the rotational speed of the cage, the number of revolutions per test, and the number of cigarettes per test portion which in turn depends on the diameter of the cigarettes. As a first result of the test, the mass of tobacco falling from the test portion is determined . From this mass and the physical dimensions of the test cigarette, the loss of tobacco per open end is determined

F-1 APPARATUS

F-1.1 End Stability Tester — A schematic diagram of this tester is given in Fig. 3. The tester should comply with the following requirements:

F-1.1.1 *Test Cage* — The test cage, the main part of the tester, shall have an elliptical cross section formed from 44 stainless steel rods of 3.0 ± 0.05 mm. The spacing between adjacent rods shall be smaller than the diameter of the cigarettes to be tested but wide enough for any strands of tobacco lost from the test portion during a test to fall through.

F-1.1.2 The positioning of the rods and their spacing in the cage is given below. The centre of the rods are located on an eclipse that satisfies the following function, shown in Fig. 4.

$$x^2 / a^2 + y^2/b^2 = 1$$

where, a = 54.0 mm, b = 36.5 mm

The clearance of the rods is 3.5 mm.

F-1.1.3 The theoretical location of the centre of the rods is identified by the cartesian coordinates X_n and Y_n as given in Table 2 and shown in Fig. 5.

F.1.1.4 Bearings shall be provided at the centre point of each elliptical end face to enable the cage to be held horizontally and allowing it be rotated about its longitudinal axis.

F-1.1.5 To permit tests to be carried out simultaneously on more than one test portion or on test portions from different samples, the cage may be equipped with one or more dividers along its length so as to create several test compartments. The tester diagram shown in Fig. 3 has four compartments.

F-1.1.6 Each test compartment shall be equipped with one movable end plate in addition to its fixed end face, so that the effective length of the compartment can be adjusted to match the length of the cigarettes under test.

F-1.1.7 Each test compartment shall be provided with means of opening to allow for loading and unloading of its test portion and with a removable pan arranged beneath it to collect all of the tobacco which falls out from the ends of the cigarettes during the test.

F-1.1.8 The tester shall be equipped with a drive system capable of rotating the cage and its contents at a rotational speed of 90 r/min ± 1 r/min. The drive system shall be controlled by a preset counter that stops the rotation of the cage automatically when the specified number of revolutions is reached. For normal testing, 270 revolutions are specified.

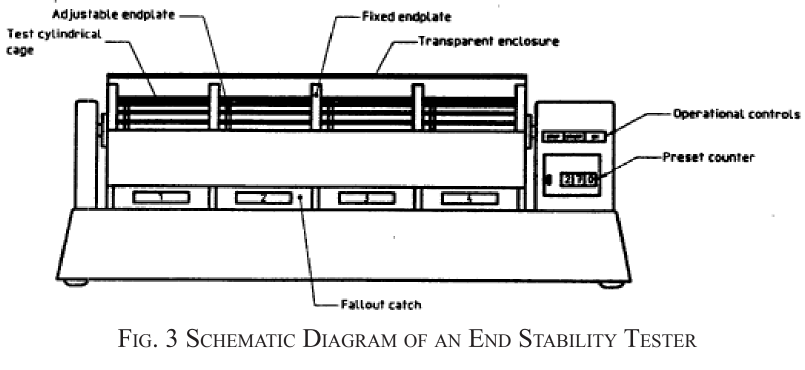

FIG. 3 SCHEMATIC DIAGRAM OF AN END STABILITY TESTER

NOTE — End stability testers complying with the requirements prescribed here are available commercially. The user instructions provided by the supplier should be followed when using such a tester.

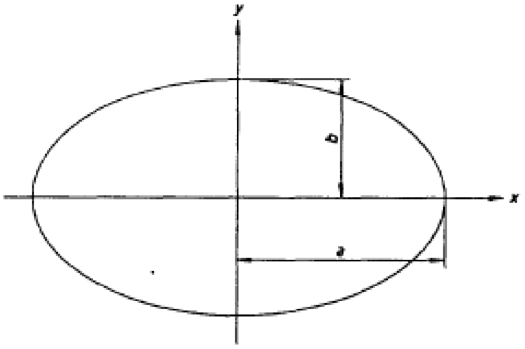

FIG. 4

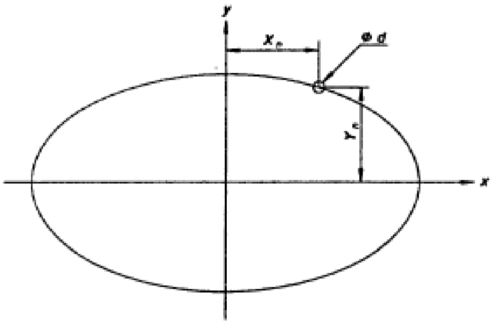

FIG. 5

Table 2 Theoretical Rod Positions

(*Clause* F-1.1.3)

Sl No. (1)	n (2)	±Xn (3)	±Yn (4)
i)	1	3.258	36.434
ii)	2	9.752	35.900
iii)	3	16.178	34.824
iv)	4	22.484	33.186
v)	5	28.607	30.957
vi)	6	34.463	28.100
vii)	7	39.937	24.567
viii)	8	44.869	20.309
viii)	9	49.030	15.295
ix)	10	52.116	9.556
x)	11	53.784	3.258

NOTE — In practice, the deviation from these points shall not exceed 0.3 mm.

F-1.2 Analytical Balance, capable of weighing to an accuracy of 0.1 mg.

F-2 PROCEDURE

F-2.1 Conditioning of Test Sample

Condition the sample in a conditioning chamber in accordance with **7.2**. Take a test portion from the conditioned sample and determine the moisture content in accordance with **6** of IS 5643.

NOTE — Although the moisture content is not used when calculating the loss of tobacco from cigarette ends, it may affect the results. The moisture content should, therefore, be determined and reported.

F-2.2 Determine the mean length of cigarettes to be tested in accordance with the process prescribed in Annex A, to the nearest 0.5 mm.

F- 2.3 Determine the mean diameter of the cigarettes to be tested in accordance with the process prescribed in Annex B, to the nearest 0.05 mm.

F-2.4 Select from the conditioned test sample the number of cigarettes specified in Table 3 for the measured diameter to form a test portion.

F-2.5 Set the adjustable end plate(s) of the test compartment(s) to give a distance between the end faces of ±0.5 mm.

F-2.6 Check that the fallout pans are clean, weigh them to the nearest 0.1 mg and replace them in the tester (Fig. 3).

F-3 DETERMINATION

F-3.1 Operate in the test atmosphere specified in **7.2**.

F-3.2 Taking care to avoid damage to the cigarettes, transfer the test portion(s) to the test compartment(s).

F-3.3 Close the test compartment(s) and the cover of the tester, reset the counter and start the test.

F-3.4 Once the drive stops after 270 revolutions, remove the fallout pans and weigh them again to the nearest 0.1 mg. Calculate the fallout quantity for each test portion. Discard the cigarettes tested.

F-3.5 Repeat the test 5 to 10 times depending on the accuracy desired.

Table 3 Number of Cigarettes Per Test Portion Depending Upon their Diameter

(*Clause* F-2.4)

Diameter of the Cigarettes Tested (mm) (1)	Number of Cigarettes for One Test Portion (2)	Diameter of the Cigarettes Tested (mm) (3)	Number of Cigarettes for One Test Portion (4)
5.00	128	7.10	63
5.10	123	7.20	61
5.20	118	7.30	60
5.30	114	7.40	58
5.40	110	7.50	57
5.50	106	7.60	55
5.60	102	7.70	54
5.70	98	7.80	52
5.80	95	7.90	51
5.90	92	8.00	50
6.00	89	8.10	48
6.10	86	8.20	47
6.20	83	8.30	46
6.30	80	8.40	45
6.40	78	8.50	44
6.50	76	8.60	43
6.60	73	8.70	42
6.70	71	8.80	41
6.80	69	8.90	40
6.90	67	9.00	39
7.00	65		

F-4 CALCULATION

Loss of tobacco per open end of a cigarette, expressed as mg/cigarette, is calculated by the following formula:

$$m_{LOE} = \frac{m_L}{q \cdot q_{OE}}$$

where,

m_L is the of mass of tobacco fallout, in mg, related to test portion of cigarettes; and

q is the number of cigarettes in a test and *qOE* is the number of open ends of the cigarettes tested being equal to 1 in the case of filter cigarettes, and to 2 in the case of plain cigarettes.

F-5 REPORTING

The test report shall indicate the method used and the results obtained, in particular:

a) Full identification of the sample;
b) Method and date of sampling;
c) Date of testing;
d) Characteristic data of cigarettes (plain or filter, length, diameter and number of open ends);
e) Number of cigarettes in the test sample;
f) Moisture content of cigarettes;
g) Rotation speed and number of revolutions (if they differ from those specified in **F-1.1.8**);
h) Number of single measuring results;
j) Mean value for the single measuring results;
k) Minimum and maximum value of single measuring results;
m) standard deviation for the single measuring results if their number is >3; and
n) It shall also mention any operating conditions not specified in this part of IS 1577 as well as any circumstances which may have influenced the results.

Bureau of Indian Standards

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Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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